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APPLICATION FOR UNITED STATES PATENT

Inventor: Kevin Corcoran, John Payne

Title: PACKAGING AND ORGANIZING ORTHODONTIC APPLIANCES
FOR LOADING OF SET-UP TRAYS THEREWITH

SPECIFICATION

WOOD, HERRON & EVANS, L.L.P.
2700 Carew Tower
441 Vine Street
Cincinnati, Ohio 45202
(513) 241-2324 (voice)
(513) 241-6234 (facsimile)
Attorney Docket No.: **ORM-242US**

**PACKAGING AND ORGANIZING ORTHODONTIC APPLIANCES
FOR LOADING OF SET-UP TRAYS THEREWITH**

[0001] This invention relates to the packaging of dental appliances, particularly orthodontic appliances, and to the organizing of the appliances for their loading onto set-up trays. The invention particularly relates to methods of packaging and organizing of the appliances and of loading set-up trays with the appliances, and to the packages, organizers and set-up trays and appliance packaging, loading and organizing systems.

Background of the Invention

[0002] In the practice of dentistry, the efficient use of a dentist's time is enhanced by preparing the equipment and supplies needed by the dentist for a scheduled patient visit in advance of appointment, so that the dentist may proceed directly with an examination or treatment. The preparation is typically done by a technician or assistant on the dentist's staff. As a result, the dentist may see more patients in a specified period of time than would be possible if the dentist were to personally assemble the items.

[0003] Orthodontic practitioners, for example, have a number of examination or treatment activities, each of which may require different tools or supplies. A common task for an orthodontist is the installation of an orthodontic appliance on a patient. Currently, a most effective and widely used orthodontic appliance is an orthodontic brace that is formed of an archwire and a number of orthodontic brackets. Installation of such an appliance involves the bonding of the individual brackets of a set, each specific one to a given one of the patient's teeth. For such an installation, a set of brackets must be assembled for the orthodontist, along with adhesives, primers and other chemical substances, plus tweezers, curing light guns and other tools needed for the appliance installation.

[0004] The installation of a bracket-archwire appliance requires careful selection and placement of individual brackets from a supply thereof onto the crown of a patient's teeth in a one-by-one transfer of the brackets from the supply to the patient. The transfer involves the engagement of the correct bracket for a given tooth and the proper orientation of the bracket for placement on the appropriate tooth. Since the brackets are each tooth-specific, with each having a geometry specially configured to fit the surface of a tooth and to engage an archwire to exert specific forces on the tooth, an error in the selection of a bracket can be costly in terms of treatment time and loss of treatment quality.

[0005] Placement of a bracket on a patient's tooth requires the holding of the bracket by the orthodontist, usually with a pair of tweezers designed for that purpose, with the base of the bracket coated with adhesive and oriented for placement against the patient's tooth. Each bracket base may be considered as having four sides, one intended as the gingival side that must face the gum when mounted on the tooth with the opposite intended as the occlusal side which will face the occlusal plane. At right angles to these are the opposite sides intended as the mesial and distal sides, which must face the mesial and distal sides of the tooth, respectively. This requires proper orientation of the bracket in the hand of the orthodontist, with the gingival side facing downward for lower teeth and facing upward for the upper teeth.

[0006] Historically, an orthodontist stocks a plurality of brackets for each tooth, which have been often supplied loose in boxes. Each bracket was retrieved from a respective one of the boxes and oriented for application to the patient's tooth. When the orthodontist undertakes to retrieve the brackets from the boxes at chair-side, considerable professional time is consumed, while care must be taken to insure that the correct bracket is retrieved for a given tooth and is oriented correctly to have its pad coated with adhesive and applied to the tooth. The orthodontist will typically stock one type or model of appliance that is most commonly suitable for a patient, plus alternative types or sizes for use as the case may indicate.

[0007] The trend toward the use of a set-up tray has resulted in better use of the orthodontist's chair-side time in installing orthodontic appliances. This time has been replaced by technician or assistant time in loading the set-up trays employing many of the same motions and careful attention previously employed by the orthodontist. Set-up

trays are usually hand-size trays or cards having compartments or sticky adhesive-coated pad areas to hold the individual appliances in a predetermined arrangement for pick-up by the orthodontist at tray side. Set-up trays of the type that not only hold the brackets for the orthodontist but present tooth-specific, single-doses of adhesive for use with each respective bracket are described in U.S. Patents Nos. 6,213,767 and 6,482,003. Simpler set-up trays that hold only the brackets are also common.

[0008] Whether done by the practitioner or the practitioner's assistant, the efficiency of dental practice and the reduction of error occurrence can be improved by better ways for supplying and handling dental supplies.

Summary of the Invention

[0009] A primary objective of the present invention is to improve the efficiency and accuracy of dental practice, and particularly orthodontic practice.

[0010] According to certain principles of the present invention, dental appliances are provided by a manufacturer or supplier thereof packaged in a manner that promotes their efficient handling by the practitioner. According to other principles of the invention, the appliances are organized and set-up trays are loaded in a manner than requires less time and results in fewer errors than with the prior art.

[0011] According to the illustrated embodiments of the invention, orthodontic appliances, particularly tooth-specific orthodontic brackets, are packaged in a predetermined orientation in a package containing a plurality of identical brackets of a given type and for a given tooth. The package is configured as an elongated package that serves as a carrier of the brackets to an organizing tray.

[0012] Further according to the illustrated embodiments of the invention, an organizer tray is provided with slotted recesses to receive each of a plurality of carriers, each containing a different bracket of a set. The recesses are arranged on the organizer tray so as to correspond to a logical arrangement that make it clear to an experienced practitioner which one contains brackets for which tooth. The organizer tray also contains a support for a set-up tray, such as a tray of the type described in U.S. Patents Nos. 6,213,767 or 6,482,003. These set-up trays each contain bracket support areas, one for each tooth, arranged in a logical order that suggests the corresponding tooth of a patient for which the bracket supported thereat is for. The carrier supporting recesses are

arranged on the organizer tray in a one-for-one correspondence to the areas of a set-up tray supported on the organizer tray.

[0013] According to still other principles of the invention, the organizer tray is in the form of a drawer cover, which covers a drawer having a plurality of compartments each arranged in the same order as and lying below the recesses of the organizer tray when the tray is applied to cover the drawer. In each of the compartments is stored a plurality of the carriers containing the brackets in the corresponding recesses of the organizer-tray drawer-cover. The drawer constitutes the orthodontist's supply of brackets for appliances of a particular type. The orthodontist may have a plurality of such drawers, one for each type of bracket or appliance used by the orthodontist. These drawers may be stored in a supply cabinet.

[0014] In practice, pluralities of each of the brackets used by an orthodontist are supplied to the orthodontist's office and each of the drawers are stocked. When a case is scheduled for installation of an appliance on a patient, an orthodontic assistant withdraws the organizer tray containing the brackets of the type selected by the orthodontist, and, if any of the recesses is empty of a carrier containing at least one bracket, loads a carrier into that recess. The assistant also places an empty set-up tray on the support on the organizer tray. Then, the assistant uses a tweezers to remove one bracket from each carrier and transfers the bracket to a corresponding area of the set-up. Each bracket is placed on the respective area in an orientation that will enable the orthodontist to remove it without reorienting it for placement onto the patient's tooth. This orientation is preferably the same orientation that the bracket has on the carrier that is inserted into the recess on the organizer tray. The brackets were loaded into the carrier, which served as its packaging for shipment, by the appliance manufacturer to the practitioner.

[0015] The set-up tray, so loaded, maximizes the use of the time not only of the orthodontist, but of the orthodontist's assistant. Additionally, bracket orientation and selection errors are minimized.

[0016] These and other objectives and advantages of the present invention will be more readily apparent from the following detailed description.

Brief Description of the Drawings

[0017] **Fig. 1** is a perspective view of one version of an orthodontic set-up tray of the prior art.

[0018] **Fig. 2** is a perspective view of one embodiment of an orthodontic bracket package and carrier according to certain principles of the present invention.

[0019] **Fig. 2A** is an enlarged view of a portion of the package and carrier of **Fig. 2**.

[0020] **Fig. 3** is a perspective view of an orthodontic bracket organizer according to certain embodiments of the present invention, in a closed condition.

[0021] **Fig. 3A** is a disassembled perspective view of the upper sliding portion of the organizer of **Fig. 3**.

[0022] **Fig. 3B** is a disassembled perspective view of the lower base portion of the organizer of **Fig. 3**.

[0023] **Fig. 4** is a cross-sectional elevational view of the organizer tray of **Fig. 3** taken along line 4-4 of **Fig. 3**.

[0024] **Fig. 5** is a perspective view, similar to **Fig. 3**, of an organizer in an open condition.

[0025] **Fig. 6** is a perspective view of the organizer of **Fig. 3**, showing the organizer in use.

[0026] **Fig. 6A** is an enlarged perspective view of a portion of **Fig. 5**.

Detailed Description

[0027] In most dental practices, a set-up tray of some sort is prepared by a dental assistant and placed at chair-side next to a patient before the dental practitioner enters the treatment area for a dental appointment. This is particularly true in orthodontic practices for appointments to install orthodontic appliances on patients. In such orthodontic practices, an orthodontic set-up tray is typically loaded with orthodontic appliances that have been pre-selected by the practitioner for treatment of a patient for whom an appointment has been scheduled to install the appliance. One of several such prior art set-up trays that are in use by orthodontists is illustrated in **Fig. 1**.

[0028] In **Fig. 1** is illustrated a set-up tray 10 of the type described in U.S. Patents No. 6,482,003, hereby expressly incorporated by reference herein, and which is used in the description of the invention below. It is one prior art example of several

types of set-up trays that can be used with the present invention. The particular set-up tray 10 that is illustrated and described is, in addition to being a set-up tray, a delivery system for delivering orthodontic adhesive in individual bracket doses for securing orthodontic brackets to teeth, although the adhesive delivery feature is not a necessary feature of any set-up tray for use with the present invention. The set-up tray 10 includes a resilient foam-board base 11 having a smooth plastic surface 12 that contains bracket mounting areas 13 and 14, lying on opposite sides of a centerline 19, that are coated with tacky pressure-sensitive adhesive. The area 13, when held by an orthodontist, will lie along the side of the tray 10 that faces a patient and will hold brackets 30 for the patient's upper dental arch, while the area 14 will lie along the side toward the orthodontist and will hold brackets for the patient's lower arch. The brackets 30 will be arranged on the tray in the order of the teeth in the patient's mouth, with staging areas 15 on the left side of the tray containing, from left to right, brackets for the right second molar through the right central incisor, and staging areas 16 on the right side of the tray containing, from left to right, brackets for the left central incisor through the right second molar. In the center of the tray 10 are provided enclosures 17 containing single doses of adhesive corresponding to each of the brackets, and cups 18 for holding primers or cleaning liquid.

[0029] Fig. 2 illustrates a package 20 embodying certain features of the present invention. The package 20 includes an elongated carrier 21 having a plastic base 22 with an elongated recess 23 formed therein. The cavity contains a flexible foam insert 24 having a plurality of cavities 25 therein adapted to receive and to snugly but releasably hold an orthodontic bracket 30, as illustrated in more detail in Fig. 2A. The base 22 of the carrier 21 has a tab or handle 26 formed at one end thereof that is part of a flat flange 27 that extends in a plane around the recess 23. The package 20 includes a clear plastic cover 28 that slides over the carrier 21, having internal channels formed therein into which the flange 27 of the base 22 fit. The cover 28 covers the brackets 30 and keeps them in the cavities 25 for shipment from the bracket manufacturer.

[0030] The brackets 30 have pads or bases 31 to which is attached or integrally formed a bracket body 32 that is typically composed of a pair of tie wings 33 in which is formed a generally horizontal archwire slot 34. As illustrated in Figs. 2 and 2A, the brackets 30 are packaged in the cavities 25 of the carrier 21 with base 32 facing down so that the tie wings can be gripped easily with tweezers to remove the bracket from the

package 20. Further, the brackets 30 may each be considered as having four sides 35-38 that include a gingival side 35 that will face the gum when the bracket 30 is mounted on a patient's tooth. The brackets 30 are inserted into the cavities of the package 20 oriented such that the gingival side 35 of the bracket 30 faces the handle or tab 26 of the carrier 21. The other sides 36-38 include, proceeding clockwise around the bracket 30, a first mesial/distal side 36, an occlusal side 37 that is opposite the gingival side 35, and a second mesial/distal side 38 that is opposite the first mesial/distal side 36. For upper right and lower left brackets, side 36 is the mesial side of the bracket and side 38 is the distal side of the bracket; and for upper left and lower right brackets, side 36 is the distal side of the bracket and side 38 is the mesial side of the bracket.

[0031] The packages 20 have a plurality of the cavities 25 in a line. For brackets of more often used prescriptions, the number of cavities 25 in the plurality is typically seven to ten. The packages 20 may be made with other numbers of cavities 25. Three to five brackets per package may be a practical number, particularly for brackets of less often used appliance prescriptions.

[0032] According to a method of the present invention, brackets 30 are loaded onto a set-up tray 10 from the carriers 20 by personnel at a treating orthodontic practitioner's office with the use of an organizer 40, illustrated in **Fig. 3**, also according to the present invention. The organizer 40 includes an organizer tray 41 and a storage base 42. Both the organizer tray 41 and storage base 42 is each preferably made of a respective integral piece of molded plastic, although metal or other materials may be used.

[0033] The organizer tray 41 has a four-sided, set-up-tray-receiving recess 43 formed at its center and a plurality of appliance holders 44. The holders are in the form of three-sided, open-ended, carrier-receiving recesses or slots 44, half of which are formed along one side of the organizer tray 41 and half formed along the opposite side of the organizer tray 41. The holders 44 are configured to hold the appliances 30, preferably in packages of appliances, such as the carriers 21. The number of the carrier-receiving recesses 44 is equal to the maximum number of brackets 30 that will form an orthodontic brace, typically twenty-eight.

[0034] As illustrated in **Figs. 3** and **3A**, the organizer tray 41 is prepared by placing in the recess 43 an empty set-up tray 10 that is to be loaded with brackets from

carriers 21. Carriers 21 containing brackets 30 are inserted into the slots 44 of the organizer tray 41, with their covers 28 removed, by sliding the flanges 27 onto grooves 45 in the sides of the slots 44, with the handles or tabs 26 of the carriers 21 at the open ends of the carrier-receiving recesses 44. Each slot 44 receives a carrier 21 containing brackets for a different one of the teeth. The carriers 21 containing the different brackets 30 of a set are loaded into the slots 44 of the organizer tray 41 in the same relative order as the staging areas 15 and 16 are arranged on the set-up card, with the upper bracket carriers 21, carriers 21a, along the side 46 that is adjacent the upper bracket mounting area 13 of the set-up tray 10, while the carriers 21 and with the lower bracket carriers 21, carriers 21b, along the side 47 that is adjacent the lower bracket mounting area 14 of the set-up tray 10. That is, the fourteen slots 44 along the side 46 of the organizer tray 41 contain brackets 30 for the upper teeth, arranged, left to right with brackets for the upper right second molar to the upper left second molar, and the fourteen slots 44 along the side 47 of the organizer tray 41 contain brackets 30 for the lower teeth, arranged, left to right with brackets for the lower right second molar to the lower left second molar.

[0035] The base 42 contains hollow storage compartment 51-53, as illustrated in **Figs. 3B** and **4**. The compartment 51 is directly beneath the recess 43 in the organizer tray 41 when the tray 41 is in a closed position over the base 42 (**Fig. 3**). The compartment 51 contains a supply of empty set-up trays 10. Similarly, the compartment 52 is directly beneath the slots 44 on side 46 of the organizer tray 41 when the tray 41 is in this closed position and holds a supply of carriers 21a that contain upper brackets 30; and the compartment 53 is directly beneath the slots 44 on side 47 of the organizer tray 41 when in the closed position and holds a supply of carriers 21b that contain lower brackets 30.

[0036] The organizer tray 41 forms a cover to the compartments 51-53 in the base 42, and slides over the base 42 with its outer edges along sides 46 and 47 fitting into grooves 54 along the sides of the base 42 adjacent compartments 52 and 53, respectively. The organizer tray 41 is shown in its closed position over the base 42 in **Fig. 3** and in a partially open position in **Fig. 5**.

[0037] Further, a lid 50 may be provided to cover the organizer tray 41 so that the entire organizer 40 can be stored when partially empty carriers 21 are present in the

slots 44 of the organizer tray 41. This allows the organizer 40 to be stored in any condition at the office of the orthodontic practitioner. Typically, a slotted cabinet or rack (not shown) is provided at the practitioner's office for storage of organizer trays 40 containing different bracket prescriptions or types.

[0038] The use of the organizer 40 is illustrated in **Figs. 6 and 6A**. The contemplated typical use of the organizer 40 involves the use of the organizer tray 41 by an orthodontic assistant to load a set-up tray 10 with one set of orthodontic brackets 30 to provide to the treating practitioner in installing the brackets 30 on the teeth of a patient. The assistant may use the organizer tray 41 separate from the base 42, or with the base 42 still attached. In loading a set-up tray 10, supported in the recess 43 at the center of the organizer tray 41, the assistant may use an instrument such as a pair of tweezers 60 to transfer each bracket 30 of a set from a hole 25 in a carrier 21 onto a staging area 15 for the particular bracket 30 on the set-up tray 10. The brackets 30 are placed on the staging areas 15 of the set-up tray 10 with their occlusal sides 37 facing the centerline 19 of the set-up tray 10. Because the brackets 30 are provided in the carriers 21 with their gingival edges facing the handles 26 of the carriers 21, and the carriers 21 are loaded into the slots 44 on the organizer tray 41, the brackets 30 are oriented on the organizer tray 41 so their occlusal edges face the centerline 19 of the set-up tray 10 that is supported in the recess 43. Accordingly, a mere translation, with no rotation, is all that is required to load a bracket 30 from a carrier 21 to the set-up card 19.

[0039] The organizer tray 41 is, in the preferred embodiment, loaded with supplies of brackets 30 from the compartments 52 and 53 beneath the corresponding slots 44 of the tray 41. This loading is carried out by removing one of the packages or carriers 21 from the compartment 52 or 53 and sliding the flanges 27 of the carriers 21 into the slots 45 of the tray 41, with the handles 26 of the carriers 21 facing away from the recess 43 that holds the set-up tray 10. In an alternative embodiment, the carriers 21 and the holders 44 may be configured so that the appliances 30 can be transferred from the alternatively configured versions of the packages 21 to alternatively configured versions of the holders 44, with their orientations preferably preserved in the transfer.

[0040] When a set-up 10 tray is loaded as described above, an orthodontist may hold the set-up tray 10 with the centerline horizontal and the side holding the bracket mounting areas 13 facing the patient, and then similarly transfer the brackets 30 with

tweezers onto the teeth of the patient. Such transfer requires only rotating the pad 31 of the bracket 30 from a horizontal to a vertical plane. Further reorientation of a bracket 30 is not necessary to place the bracket 30 in its correct orientation for mounting on the patients tooth.

[0041] The invention has been described in the context of exemplary embodiments. Those skilled in the art will appreciate that additions, deletions and modifications to the features described herein may be made without departing from the principles of the present invention. Accordingly, the following is claimed: